



Echocardiography Profile in HIV Patients and Its Correlation with CD4 Count and who Clinical Staging

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Abstract

With the global epidemic of HIV, developing countries like India are having a rapid surge in the number of HIV cases. An effective strategy needs to be formulated for the management of HIV which has multisystem involvement. Unfortunately, due to poor laboratory infrastructure in many parts of the country CD4 testing, both initial and repeat, in patients of HIV who have cardiac involvement, is not possible. Present study done in the PG Department of Medicine and Cardiology Department of Sarojini Naidu Medical College (Agra, U.P.) uses both the CD4 count and the WHO clinical stage of HIV patients to correlate with the echocardiographic abnormalities. It is concluded that besides the CD4 count, the echocardiographic abnormalities correlate very well with the WHO clinical stage of the patient. Hence, all patients with low CD4 count and those in late clinical stages should be screened for cardiovascular abnormalities.

Keywords: 2D Echocardiography, HIV, CD4 count, WHO clinical stage.

Introduction

Presently HIV is a global problem with more than 40 million people infected throughout the world. It has multi system involvement and cardiac manifestations of HIV are a very important cause of mortality and morbidity. Cardiac manifestations of HIV are predominantly LV dysfunction, PAH (pulmonary artery hypertension), and diastolic dysfunction and also various regurgitant valvular abnormalities¹.

Echocardiography is a very important tool for assessment of severity of cardiac complications². Present study is undertaken in the Department of Medicine and Department of Cardiology to know the Echocardiography profile of HIV patients and its correlation with CD4 count and WHO clinical staging, so that a better strategy can be formulated for the management of patients of HIV which has multisystem involvement.

Materials and Methods

200 newly diagnosed patients registered in ART Center were studied. The study is cross sectional and observational study.

Patients less than 18 years and more than 70 years, taking treatment with antiretroviral or any cardiotoxic drugs, having diabetes, hypertension, previous congenital or acquired heart disease, neoplastic diseases, family history of cardiovascular disease, deranged lipid profile were excluded from this study.

All patients were assessed clinically by detailed history taking and general physical examination. They were evaluated using two dimensional transthoracic echocardiography and color flow Doppler examination. Specific investigations were done to establish the diagnosis of HIV infection CD4 count was done for all patients. Staging of the disease was done according to the revised WHO clinical Staging of the disease.

Results

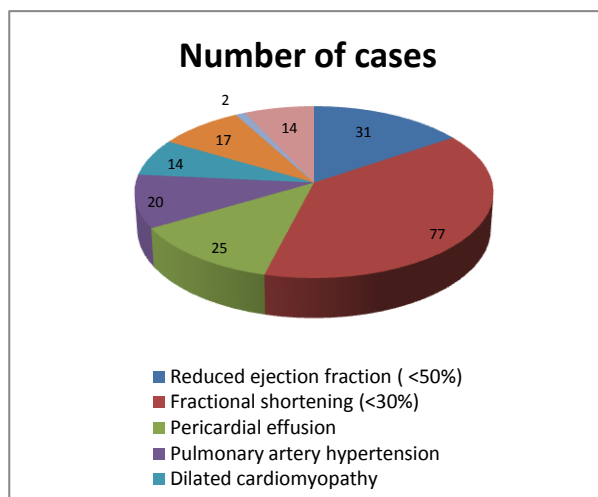
200 patients were studied of which 145(72.5%) were male and 55(27.5%) were female.

Echocardiography revealed that reduced ejection fraction (<50%) was seen in 15.5% cases and reduction in Fractional shortening (<30%) in 38.5 %cases. Pericardial effusion was seen in 12.5% while pulmonary artery hypertension was noted in 10%. Valvular regurgitation was present in 8.5% of cases. Dilated cardiomyopathy and Regional wall motion abnormality was found in 7% and 1% of the cases respectively. 7% cases had diastolic dysfunction. (Table 1)

Table 1: 2D echocardiography findings in the cases studied.

| Sr. No. | Cardiac manifestation | Number of cases | Percentage |
|---------|----------------------------------|-----------------|------------|
| 1 | Reduced ejection fraction (<50%) | 31 | 15.5 |
| 2 | Fractional shortening (<30%) | 77 | 38.5 |
| 3 | Pericardial effusion | 25 | 12.5 |
| 4 | Pulmonary artery hypertension | 20 | 10.0 |
| 5 | Dilated cardiomyopathy | 14 | 7.0 |
| 6 | Valvular regurgitation | 17 | 8.5 |
| 7 | Regional wall motion abnormality | 2 | 1.0 |
| 8 | Diastolic dysfunction | 14 | 7.0 |

Graph 1 showing 2D echocardiography findings in the cases studied



On correlating the echocardiographic findings with CD4 count it was seen that maximum findings were seen in patients with CD4 count less than 200. Out of 31 patients with reduced EF, 16 had CD4 count less than 50. Similarly regarding reduction in fractional shortening, 34 out of total 77 had CD4 count less than 50. 12 out of 14 cases of dilated cardiomyopathy had CD4 count less than 50. Maximum number of cases with pericardial effusion, diastolic dysfunction and Pulmonary artery hypertension had CD4 count less than 50 the 2 cases of regional wall motion abnormality also had cd4 count less than 50. (Table 2)

Graph 2 showing Association of 2D Echocardiography findings with CD4 count

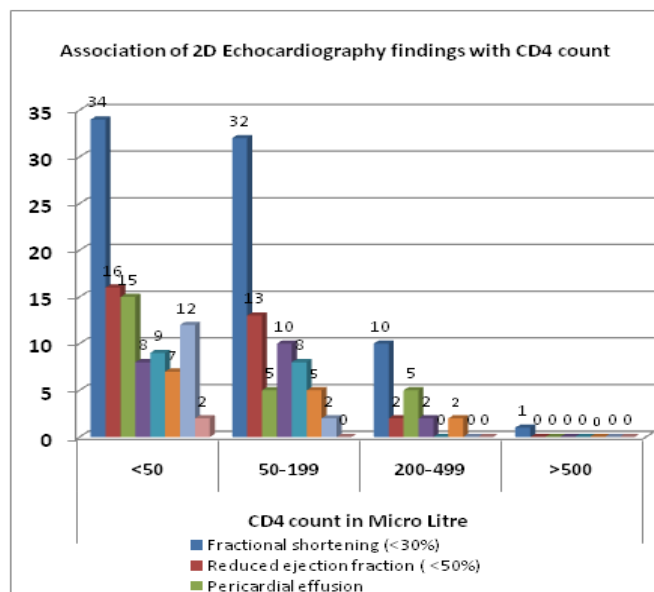


Table 2 : Association of 2D Echocardiography findings with CD4 count

| S.No. | Cardiac Manifestations | CD4 count in Micro Litre | | | | |
|-------|----------------------------------|--------------------------|--------|---------|------|-------|
| | | <50 | 50-199 | 200-499 | >500 | Total |
| 1 | Fractional shortening (<30%) | 34 | 32 | 10 | 1 | 77 |
| 2 | Reduced ejection fraction (<50%) | 16 | 13 | 2 | 0 | 31 |
| 3 | Pericardial effusion | 15 | 5 | 5 | 0 | 25 |
| 4 | Pulmonary artery hypertension | 8 | 10 | 2 | 0 | 20 |
| 5 | Valvular regurgitation | 9 | 8 | 0 | 0 | 17 |
| 6 | Diastolic dysfunction | 7 | 5 | 2 | 0 | 14 |
| 7 | Dilated cardiomyopathy | 12 | 2 | 0 | 0 | 14 |
| 8 | Regional wall motion abnormality | 2 | 0 | 0 | 0 | 2 |

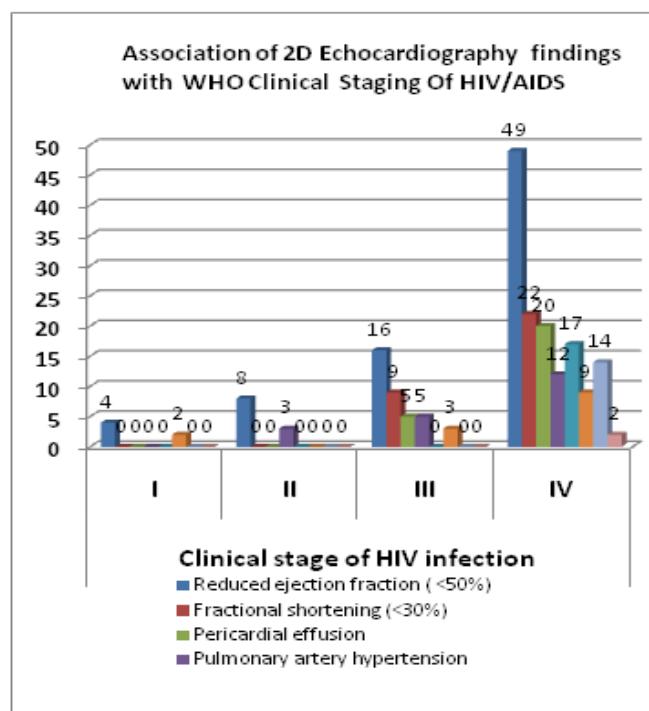
On comparing the echocardiography findings with revised WHO clinical staging, maximum number of findings were seen in patients in clinical stage 4. Out of total 31 patients with reduced ejection fraction, 22 patients were in stage 4. Similarly in those with reduce FS, 49 out of total 77 were in

stage 4. All of 14 cases with dilated cardiomyopathy were in stage 4. Maximum number of cases with pericardial effusion, diastolic dysfunction and Pulmonary artery hypertension were also in stage 4. The two cases of RWMA were also in stage 4. (Table 3)

Table 3: Association of 2D Echocardiography findings with WHO Clinical Staging Of HIV/AIDS

| S.No. | Cardiac Manifestations | Clinical stage of HIV infection | | | | |
|-------|----------------------------------|---------------------------------|----|-----|----|-------|
| | | I | II | III | IV | Total |
| 1 | Reduced ejection fraction (<50%) | 4 | 8 | 16 | 49 | 77 |
| 2 | Fractional shortening (<30%) | 0 | 0 | 9 | 22 | 31 |
| 3 | Pericardial effusion | 0 | 0 | 5 | 20 | 25 |
| 4 | Pulmonary artery hypertension | 0 | 3 | 5 | 12 | 20 |
| 5 | Valvular regurgitation | 0 | 0 | 0 | 17 | 17 |
| 6 | Diastolic dysfunction | 2 | 0 | 3 | 9 | 14 |
| 7 | Dilated cardiomyopathy | 0 | 0 | 0 | 14 | 14 |
| 8 | Regional wall motion abnormality | 0 | 0 | 0 | 2 | 2 |

Graph 3 showing association of 2D Echocardiography findings with WHO Clinical Staging of HIV/AIDS



Discussion

In our present study we studied the echocardiography profile of the HIV patients and compared it with the level of CD4 count and the WHO clinical stage of the patient. The clinical staging and case definition of HIV were developed by the WHO in 1990 and revised in 2007. Staging is based on clinical findings that guide the diagnosis, evaluation, and management of HIV/AIDS, and it does not require a CD4 cell count. In resource constrained and poor countries like India where the facilities of CD4 count are very limited in many parts, this staging system is very useful to determine eligibility for antiretroviral therapy. Hence the correlation of the stage of disease with the echocardiography findings can help to know which patients are likely to be more benefited with the screening for cardiovascular involvement.

The present study shows that echocardiography abnormalities are common in HIV patients (Table 1, Graph 1). Commonest manifestation found was reduction in FS which was consistent with the studies done in India by Agrawal et al(2016)³ which found Grade 1 DD in 20%, FS in 12% ,reduced EF in 2%, dilated cardiomyopathy, pericardial effusion and regional wall motion abnormality in 1%each among the 100 patients studied. Also most patients with cardiac manifestations were in Stage III and stage IV.

Reduction in EF was seen in 15.5% cases in the present study while dilated cardiomyopathy detected in 7% cases. Deepak et al (2016)⁴ also studied cardiac manifestations in HIV and found most common cardio vascular finding was of asymptomatic FS (20.7%) followed by that of reduced EF(15.5%) and diastolic dysfunction (12.2%) which is similar in the present study. Studies published by Moreno et al⁵ and Hakim et al⁶ had dilated cardiomyopathy to be 6% and 5% respectively.

Most of the echocardiographic abnormalities were seen in WHO clinical stage 4 (table 3, Graph 3)which is similar with the studies done by Khunnawate et al² and Zareba et al⁷ who have shown that cardiac manifestations occur late in the course of the disease.

Previous studies have shown that HIV related cardiac manifestations are often seen in a state of severe immunosuppression with low CD4 count (<200/microL) (table 2). This study (table 2, Graph 2) showed that patients with CD4 count less than 200/microL had a high prevalence of echocardiographic abnormalities than those with CD4 count more than 200/microL. Various studies agree that the most important factor in development of cardiac abnormalities is the level of immunosuppression and there is a tight correlation between CD4 count and echocardiographic abnormalities which is also demonstrated in the present study.

Conclusion

As the cases of HIV are on the rise worldwide and particularly in developing countries like India, the formulation of management strategies which are best and also very resource oriented at the same time, is a challenging task. In the present study we have seen that cardiac manifestations of the disease are very common in the patients of HIV having low CD4 count (particularly less than 200) and those in the late stages (III and IV). Hence, if there is clinical suspicion of cardiac involvement in HIV patients, especially in those with low CD4 count and late stages (III and IV), they should be screened for cardiac abnormalities with the help of echocardiography. The modification in the treatment regimen based on the findings of echocardiography can decrease the morbidity of the patient. In India, the laboratory facilities CD4 testing is limited and is unavailable in many parts. Patients in these parts can be classified according to the WHO clinical staging and those in later stages screened for cardiac abnormalities. It is well seen in the present study that with decrease in CD4 count and increase in WHO clinical staging, cardiac manifestations in the HIV patients are increased.

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